附录A

**表A1 线路1# 滞后阶数选择AIC、SC准则和序列相关LM统计量**

**Table A1 Line 1# of lag order selection AIC,SC guidelines, and sequence-related LM statistics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 阶数  *p* | 不含时间趋势项 | | | | 包含时间趋势项 | | | |
|  | AIC | SC |  |  | AIC | SC |  |  |
| 1 | 14.2843 | 15.2374 | 0.1984 | 0.2831 | 14.3937 | 14.7944 | 3.7251 | 1.4853 |
| 2 | 14.3523 | 14.9168 | 2.5338\*\* | 1.3417\* | 14.2938 | 14.8852 | 1.5970 | 0.7142 |
| 3 | 14.2843 | 15.2374 | 0.1984 | 0.2831 | 14.2776 | 15.2580 | 0.0089 | 0.3132 |
| 4 | 14.2049 | 14.9625 | 0.6308 | 0.2649 | 14.1964 | 14.9810 | 0.4117 | 0.2547 |
| 5 | 14.3704 | 15.5216 | 0.6049 | 0.2583 | 14.3226 | 15.5013 | 3.8629\* | 1.1512\*\*\* |
| 6 | 14.4899 | 15.8419 | 0.0632 | 0.7122\* | 14.3332 | 15.7128 | 0.4182 | 0.3812\* |

注：和分别为一阶序列相关和四阶序列相关统计量；“\*、\*\*、\*\*\*”分别表示在1%、5%、10%显著性水平上拒绝序列不相关的原假设。

**表A2 线路1# 长期协整方程估计结果**

**Table A2 Line 1# of long-term co-organization equation estimates**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 变量 | 系数 | 标准误差 | t统计量 | P值 |
|  | 0.0301 | 0.0185 | 1.6273 | 0.1077 |
|  | 9.6807 | 6.4942 | 1.4907 | 0.1400 |
|  | -0.8857 | 0.5584 | -1.5863 | 0.1167 |
|  | 23.1207 | 12.3183 | 1.8769 | 0.0642 |
|  | 1.8884 | 0.5415 | 3.4872 | 0.0008 |
|  | -6.4856 | 1.9876 | -3.2631 | 0.0016 |

**表A3 线路1# 无约束ECM估计结果**

**Table A3 Line 1# of error correction model estimate results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 变量 | 系数 | 标准误差 | t统计量 | P值 |
| C | -2961.5380 | 939.9443 | -3.1508 | 0.0023 |
| T | 10.0099 | 2.5936 | 3.8595 | 0.0002 |
| S(-1) | -0.6179 | 0.0872 | -7.0835 | 0.0000 |
|  | 0.0186 | 0.0107 | 1.7416 | 0.0855 |
|  | 5.9817 | 2.5565 | 2.3398 | 0.0218 |
|  | -0.5473 | 0.2723 | -2.0098 | 0.0479 |
|  | 14.2863 | 9.9016 | 1.4428 | 0.1530 |
|  | 1.1669 | 0.3004 | 3.8839 | 0.0002 |
|  | -4.0075 | 1.2700 | -3.1555 | 0.0023 |
|  | 0.1088 | 0.2336 | 0.4657 | 0.6427 |
|  | 0.9728 | 1.5256 | 0.6377 | 0.5255 |
|  | 3.6154 | 1.7961 | 2.0129 | 0.0475 |
|  | 6.0528 | 1.6777 | 3.6078 | 0.0005 |
|  | 3.6032 | 1.7267 | 2.0868 | 0.0401 |

**表A4 线路1# VAR模型估计结果**

**Table A4 Var model estimates of line 1#**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | S |
|  | 1.1668 | -0.0002 | -0.0079 | 9.39E-05 | -0.0073 | -0.0006 | -0.0428 |
| (0.1064) | (0.0011) | (0.0134) | (0.0002) | (0.0112) | (0.0018) | (0.0292) |
| [ 10.9576] | [-0.2489] | [-0.5872] | [ 0.3673] | [-0.6531] | [-0.3656] | [-1.4688] |
|  | -0.5941 | -0.0027 | 0.0008 | -0.0002 | 0.0022 | -0.0010 | 0.0441 |
| (0.1367) | (0.0014) | (0.0173) | (0.0003) | (0.0143) | (0.0023) | (0.0374) |
| [-4.3455] | [-1.8713] | [ 0.0485] | [-0.7202] | [ 0.1533] | [-0.4244] | [ 1.1775] |
|  | 0.3168 | 0.0027 | 0.0006 | 0.0001 | -0.0114 | 0.0005 | -0.0204 |
| (0.0936) | (0.0010) | (0.0118) | (0.0002) | (0.0098) | (0.0016) | (0.0256) |
| [ 3.3852] | [ 2.7938] | [ 0.0568] | [ 0.6246] | [-1.1597] | [ 0.3434] | [-0.7962] |
|  | -18.0714 | 0.0834 | 0.1312 | -0.0011 | -1.0312 | 0.1106 | -4.8165 |
| (10.0486) | (0.1071) | (1.2728) | (0.0241) | (1.0577) | (0.1741) | (2.7554) |
| [-1.7984] | [ 0.7787] | [ 0.1030] | [-0.0466] | [-0.9749] | [ 0.6352] | [-1.7480] |
|  | 23.6568 | 0.3773 | -0.4896 | 0.0066 | -1.7546 | 0.2028 | -2.9297 |
| (9.6824) | (0.1032) | (1.2264) | (0.0232) | (1.0191) | (0.1678) | (2.6550) |
| [ 2.4432] | [ 3.6543] | [-0.3992] | [ 0.2870] | [-1.7215] | [ 1.2090] | [-1.1034] |
|  | -3.9507 | 0.2004 | -0.3860 | -0.0205 | -0.4441 | -0.0850 | -4.1031 |
| (10.2467) | (0.1092) | (1.2979) | (0.0246) | (1.0785) | (0.1775) | (2.8097) |
| [-0.3855] | [ 1.8339] | [-0.2974] | [-0.8337] | [-0.4118] | [-0.4789] | [-1.4603] |
|  | 0.0210 | -0.0118 | 0.1519 | 0.0007 | -0.0354 | -0.0150 | -0.6302 |
| (1.0218) | (0.0109) | (0.1294) | (0.0024) | (0.1075) | (0.0177) | (0.2802) |
| [ 0.0205] | [-1.0892] | [ 1.1735] | [ 0.3246] | [-0.3293] | [-0.8504] | [-2.2494] |
|  | -0.3373 | -0.0182 | -0.2721 | 0.0001 | -0.0793 | 0.0027 | -0.7184 |
| (1.0585) | (0.0112) | (0.1340) | (0.0025) | (0.1114) | (0.0183) | (0.2902) |
| [-0.3186] | [-1.6151] | [-2.0300] | [ 0.0756] | [-0.7119] | [ 0.1508] | [-2.4751] |
|  | 0.7750 | -0.0114 | 0.0624 | 0.0036 | -0.0536 | 0.0149 | -0.2338 |
| (1.1242) | (0.0119) | (0.1424) | (0.0027) | (0.1183) | (0.0194) | (0.3082) |
| [ 0.6894] | [-0.9528] | [ 0.4388] | [ 1.3506] | [-0.4533] | [ 0.7678] | [-0.7585] |
|  | 26.2786 | 1.1896 | -8.2940 | 0.5977 | -7.4670 | 0.5285 | 35.5015 |
| (62.9228) | (0.6711) | (7.9702) | (0.1511) | (6.6233) | (1.0905) | (17.2543) |
| [ 0.4176] | [ 1.7725] | [-1.0406] | [ 3.9556] | [-1.1273] | [ 0.4847] | [ 2.0575] |
|  | -109.3666 | -0.6396 | 5.3521 | 0.0704 | 9.4302 | 0.3152 | -35.2175 |
| (76.3696) | (0.8145) | (9.6735) | (0.1834) | (8.0387) | (1.3235) | (20.9416) |
| [-1.4320] | [-0.7852] | [ 0.5532] | [ 0.3841] | [ 1.1731] | [ 0.2382] | [-1.6817] |
|  | 118.4220 | -0.3793 | -12.2951 | -0.0360 | -10.7073 | 0.4665 | -15.6498 |
| (64.3525) | (0.6864) | (8.1513) | (0.1545) | (6.7738) | (1.1153) | (17.6463) |
| [ 1.8402] | [-0.5526] | [-1.5083] | [-0.2333] | [-1.5807] | [ 0.4183] | [-0.8868] |
|  | -0.0641 | -0.0160 | 0.4825 | -0.0073 | 0.5143 | -0.0257 | 0.1914 |
| (1.6386) | (0.0174) | (0.2075) | (0.0039) | (0.1724) | (0.0284) | (0.4493) |
| [-0.0391] | [-0.9178] | [ 2.3247] | [-1.8645] | [ 2.9817] | [-0.9063] | [ 0.4259] |
|  | 0.1099 | 0.0401 | -0.1707 | 0.0001 | -0.4077 | 0.0201 | 0.3749 |
| (1.8607) | (0.0198) | (0.2356) | (0.0044) | (0.1958) | (0.0322) | (0.5102) |
| [ 0.0590] | [ 2.0222] | [-0.7242] | [ 0.0443] | [-2.0820] | [ 0.6244] | [ 0.7349] |
|  | -1.5743 | 0.0024 | -0.0286 | 0.0007 | 0.1606 | 0.0174 | 0.2577 |
| (1.7248) | (0.0184) | (0.2184) | (0.0041) | (0.1815) | (0.0298) | (0.4729) |
| [-0.9127] | [ 0.1316] | [-0.1309] | [ 0.1779] | [ 0.8850] | [ 0.5852] | [ 0.5450] |
|  | 11.2694 | -0.0629 | 1.0212 | 0.0430 | 1.7868 | 0.8442 | 2.8031 |
| (7.1148) | (0.0758) | (0.9012) | (0.0170) | (0.7489) | (0.1233) | (1.9509) |
| [ 1.5839] | [-0.8290] | [ 1.1331] | [ 2.5206] | [ 2.3859] | [ 6.8469] | [ 1.4368] |
|  | -38.7250 | 0.0468 | 0.6301 | -0.0169 | -0.8090 | -0.0710 | 0.9186 |
| (9.0309) | (0.0963) | (1.1439) | (0.0216) | (0.9506) | (0.1565) | (2.4764) |
| [-4.2880] | [ 0.4866] | [ 0.5509] | [-0.7804] | [-0.8510] | [-0.4542] | [ 0.3709] |
|  | 20.8766 | -0.0615 | -0.9874 | -0.0150 | -0.8470 | -0.0429 | -7.1251 |
| (7.6849) | (0.0819) | (0.9734) | (0.0184) | (0.8089) | (0.1331) | (2.1073) |
| [ 2.7165] | [-0.7511] | [-1.0143] | [-0.8131] | [-1.0471] | [-0.3226] | [-3.3811] |
| S(-1) | 0.1295 | -0.0007 | 0.0640 | 0.0006 | 0.0502 | 0.0100 | 0.4680 |
| (0.4914) | (0.0052) | (0.0622) | (0.0011) | (0.0517) | (0.0085) | (0.1347) |
| [ 0.2635] | [-0.1408] | [ 1.0282] | [ 0.5374] | [ 0.9712] | [ 1.1804] | [ 3.4729] |
| S(-2) | -0.2667 | 0.0002 | 0.1578 | 0.0009 | 0.1089 | 0.0009 | 0.2525 |
| (0.5028) | (0.0053) | (0.0637) | (0.0012) | (0.0529) | (0.0087) | (0.1378) |
| [-0.5305] | [ 0.0431] | [ 2.4785] | [ 0.7632] | [ 2.0574] | [ 0.1097] | [ 1.8312] |
| S(-3) | -0.4288 | -0.0036 | -0.0270 | -0.0003 | 0.0395 | -0.0111 | 0.0523 |
| (0.4871) | (0.0052) | (0.0617) | (0.0011) | (0.0512) | (0.0084) | (0.1335) |
| [-0.8803] | [-0.7073] | [-0.4386] | [-0.2600] | [ 0.7714] | [-1.3201] | [ 0.3922] |
| C | 2614.2630 | 86.6911 | 297.8688 | 20.2510 | 2082.1170 | -90.7090 | 4212.5620 |
| (4495.3300) | (47.9482) | (569.4120) | (10.7957) | (473.1840) | (77.9096) | (1232.6800) |
| [ 0.5815] | [ 1.8080] | [ 0.5231] | [ 1.8758] | [ 4.4002] | [-1.1642] | [ 3.4174] |

**表A5 线路1#线损电量与用电量的方差分解表**

**Table A5 Variance decomposition of line loss and electricity usage of users of line 1#**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 时期 | 标准差 | 自身解释比例(%) | 六大因素解释(%) | 其中(%) | | | | | |
|  |  |  |  |  |  |
| 1 | 1207.3330 | 56.7393 | 43.2607 | 18.2568 | 2.4386 | 14.1390 | 6.9612 | 0.3915 | 1.0737 |
| 2 | 1949.6500 | 44.6135 | 55.3865 | 12.4728 | 2.5604 | 27.9940 | 7.2166 | 1.4181 | 3.7246 |
| 3 | 2146.6840 | 38.7871 | 61.2129 | 9.3428 | 9.3944 | 23.4959 | 7.0179 | 2.1409 | 9.8210 |
| 4 | 2345.4280 | 37.1373 | 62.8627 | 8.2274 | 12.6669 | 21.0454 | 6.2275 | 5.9479 | 8.7476 |
| 5 | 2559.5030 | 34.7951 | 65.2049 | 7.7148 | 11.7833 | 19.6457 | 5.9650 | 8.6994 | 11.3968 |
| 6 | 2740.4170 | 30.9272 | 69.0728 | 6.8552 | 11.2497 | 17.9548 | 5.6761 | 12.1895 | 15.1475 |
| 7 | 2894.4920 | 28.1498 | 71.8502 | 6.2899 | 10.9142 | 16.8894 | 5.3422 | 15.8380 | 16.5765 |
| 8 | 3020.7930 | 26.7609 | 73.2391 | 5.8680 | 10.2006 | 16.6749 | 4.9591 | 18.6966 | 16.8399 |
| 9 | 3127.2730 | 26.1730 | 73.8270 | 5.5266 | 9.6564 | 16.6965 | 4.6848 | 20.8901 | 16.3727 |
| 10 | 3227.3620 | 25.5756 | 74.4244 | 5.2581 | 9.3328 | 16.7716 | 4.4548 | 22.8059 | 15.8011 |
| 11 | 3330.7050 | 24.8997 | 75.1003 | 5.0517 | 9.0651 | 16.9270 | 4.2804 | 24.4357 | 15.3404 |
| 12 | 3438.3930 | 24.2184 | 75.7816 | 4.8808 | 8.7848 | 17.0560 | 4.1421 | 25.8959 | 15.0220 |
| 13 | 3548.8660 | 23.6426 | 76.3574 | 4.7469 | 8.5404 | 17.1455 | 4.0308 | 27.0879 | 14.8059 |
| 14 | 3661.9870 | 23.2032 | 76.7968 | 4.6433 | 8.3518 | 17.2018 | 3.9421 | 28.0257 | 14.6321 |
| 15 | 3776.8960 | 22.8953 | 77.1047 | 4.5650 | 8.2096 | 17.2189 | 3.8747 | 28.7804 | 14.4561 |
| 16 | 3892.8210 | 22.6893 | 77.3107 | 4.5065 | 8.1031 | 17.2068 | 3.8247 | 29.3805 | 14.2891 |
| 17 | 4009.1910 | 22.5509 | 77.4491 | 4.4629 | 8.0239 | 17.1720 | 3.7872 | 29.8528 | 14.1505 |
| 18 | 4124.9690 | 22.4506 | 77.5494 | 4.4299 | 7.9640 | 17.1229 | 3.7589 | 30.2290 | 14.0447 |

附录B

1. 线损电量与用电量的边限协整检验

利用ARDL边限检验法检验线路2#分线线损与接入专变用电量的长期关系。首先按式（1）对各差分变量进行充分滞后，再利用AIC和SC信息准则选择最佳滞后期数。与线路1#相同的选择差分变量最大滞后阶数为4（即*p*=5），然后在进行方程估计时加入趋势项，并根据其系数的显著性检验判断是否保留时间趋势项。对应一阶差分变量的不同滞后期数得到AIC值、SC值、1阶和4阶序列相关的LM检验统计量如表B1所示。根据AIC和SC信息准则，结合序列相关LM统计量，筛选出最优滞后期数，计算相应边限检验*F*统计量，确定最优滞后阶数为4。不含时间趋势项、含约束时间趋势项、含不约束时间趋势项的边限检验F统计量分别为：*F*1 = 6.877，*F*2 = 11.728，*F*3 = 12.839，均在5%的显著性水平上拒绝了变量间不存在协整关系的原假设，表明线损与接入的9个专变用户用电量间存在长期关系。依据AIC和SC信息准则和序列相关LM检验统计量简化处理估计方程，剔除不显著阶数后设定模型为ARDL(4, 0, 1, 0, 1, 1,0, 0, 0,4)。据此得到长期协整关系方程及无约束ECM如式（C3）和（C4）。

从长期协整方程估计结果式（C3）和表B2来看，各变量的t检验统计量表明*U*2、*U*4、*U*5、*U*8和*U*9的系数估计值十分显著，对线损有显著影响；*U*1、*U*3、*U*6和*U*7的系数估计值不显著，对线损无明显影响。各变量系数估计值的方向表明*U*4、*U*8对线损有显著促进影响，*U*2、*U*5对线损有显著削弱影响。

从无约束ECM估计结果式（C4）和表B3来看，除*U*1、*U*3、*U*6和*U*7序列外，其他序列对线损的影响均有显著滞后效应。其中*U*2、*U*5有微弱负滞后效应，*U*4有微弱正滞后效应；*U*8、*U*9既有正滞后效应，也有负滞后效应，且效应较大。

上述两个方程分别从长期和短期尺度上刻画了各变量间的影响。长期来看，*U*2、*U*4、*U*5对线损产生显著影响，在短期内也有一定影响；*U*8、*U*9在长期上对线损电量有显著影响，在短期上也有较大影响，但方向不确定。其他变量无论在长期还是短期均对线损电量无影响。

1. VAR模型构建

B2.1 最优滞后期数选取

选择最优滞后期数*p*时，要使滞后阶数足够大，以便精确反映所构造模型的动态特征。但滞后阶数越大，待估参数越多，对应模型复杂性越高。根据AIC，SC和HQ信息准则确定模型最优滞后期数，估计结果如表1所示，其中阴影部分表示在5%显著性水平上显著。

由表B4检验结果可知，当滞后期*p*为4时，所有统计量在5%的显著性水平上显著。因此，选择建立滞后期数为4的VAR模型是合理的。

B.2.2 模型稳定性检验

对于含*n*个变量的VAR(p)模型，当其特征方程所有*np*个根的倒数都落在单位圆内时，VAR模型是平稳的。线路2#的VAR模型有10个变量，最优滞后阶数为4，故应有40个点位于单位圆内。由图B1可见，所有根的倒数位于单位圆内，说明建立滞后期数为4的VAR模型整体拟合较好且稳定性高，可以进行下属专变用户用电量与线损间的脉冲响应分析。



图B1 VAR模型的单位根检验图

**Fig.B1 The unit root test of the VAR model**

B.2.3 模型确定

根据最优滞后期确定值检验，确定最优滞后阶数为4，在此和公式（5）的基础上建立VAR(4)模型，模型参数估计结果如表B5所示。线路2#包含10个变量，对应的VAR模型是由10个方程构成的方程组。表B5中，第1行是被解释变量，第1列是解释变量，2至11列中无括号数为每个方程的系数估计值，小括号的数字为估计值的标准误差，中括号的数字为估计值的t统计量。

1. 脉冲响应分析

在VAR模型估计的基础上，采用脉冲响应函数分析对线损电量在长、短期上具有显著影响的*U*2、*U*4、*U*5、*U*8和*U*9，分析结果如图B2所示。5条曲线分别代表5个专变用户的脉冲函数变化曲线（用户用电量正向单位冲击后线损电量的响应），横坐标为冲击作用期限，纵坐标为冲击响应。

图B2 线损电量与各专变用户用电量脉冲响应曲线

**Fig.B2 The pulse response curve of the line loss and electricity usage of each user**

对图B2分析如下：

* 给用户*U*2单位正向冲击后，线损电量在前12期表现为强烈的正负波动，在第20期达到负向影响极大值-23.34，随后趋于平缓。前期来看变化方向无确定性，有较弱的滞后性；后期对线损具有较小的负向冲击效应。
* 给用户*U*4单位正向冲击后，除第3期外，其他各期均呈正向冲击效应并逐渐减小。从第14期开始逐渐趋于平稳，长期来看对线损有较小的正向影响。
* 给用户*U*5单位正向冲击后，第3期对线损的影响为负，之后迅速转正，并持续5期左右；正向影响极大值在第4期，为142.33；之后开始下行，随后又缓慢上升；随着滞后期数的增加，对线损的影响逐渐趋于正向平稳。以上分析表明*U*5的冲击具有8天左右的滞后效应，但长期来看其流动方向变化无常，对线损无显著影响。
* 给用户*U*8单位正向冲击后，线损出现较大下行趋势，在第3期降至最低点-193.31，随后迅速上升为正向影响，表明*U*8的冲击有3天滞后效应。之后出现较小幅度的上下波动，在第13期到达最大值126.07且持续为正向影响。*U*8的冲击经过一段时间使线损与*U*8趋于平稳发展态势，说明*U*8对线损的正向影响力度大、持续时间较长。
* 给用户*U*9单位正向冲击后，对线损的响应迅速下降，在第4期降至最低点-142.44，随后迅速上升，在第8期达到最高点-20.85，整体对线损呈负向影响。*U*9对线损的冲击具有速度较快、持续时间相对较长的特点，第12期过后线损向平稳阶段过渡，直至完全平稳，表明*U*9通过反向削弱线损电量，使其走向新的稳定发展阶段，二者将处于长期均衡发展。

1. 动态方差分解

利用Cholesky分解法，对线损电量与下属专变用户进行动态方差分解，以揭示线损电量与下属专变用户用电量的相互作用过程与作用程度。结果如附表B6所示，具体分析如下：

* 前几期内，线损电量预测方差主要由其自身变化来解释，符合波动性强和难以预测的特点。
* 从长期来看，约88%的线损电量方差变化可由接入9个专变用户来解释。
* 在9个因素可解释部分中，用户*U*8解释程度最高，为23%左右；其次为*U*9与*U*4，两者解释程度分别为14%和12%；再次是*U*2，约为11%左右；其余用户均在7%以下。

综上，驱动线损变化的9大因素中，用户*U*8影响最大，*U*9与*U*4次之，其他因素影响极弱。以下结合附表B6具体分析用户*U*8，*U*9，*U*4，*U*2和*U*5对线损方差的贡献率。

* 在电能传输过程中，线损电量由于自身技术性损耗使其自身贡献率在第1期达到42.98%；由于下属专变用户的接入，线损电量自身作用呈逐渐下降趋势，到第13期后，自身方差贡献一直保持在12%左右。
* 用户*U*9对线损的作用贡献呈现波动上升的趋势，由第1期的3%升至第17期的13%，*U*2对线损的影响呈现先升后降的形态，前五期升至15%后逐渐下降，在15期后逐渐稳定至11%，表明对线损的作用逐渐趋于稳定平衡状态。*U*4对线损的作用持续下降，从第一期的25%降至16期后的12%，原因在于该用户为该条线路中总用电量最大的用户。传输电量初期对技术性线损电量影响较大，但由于其他窃电用户的接入，对非技术线损电量的作用占据主导，所以后期稳定在一个较小值。*U*5分析与*U*2类似。
* 输电损失中，用户*U*8对线损起到了重要推动作用，其贡献率从第一期的5%增加到第14期后的23%以上，超出线损电量自身的方差贡献，但影响幅度增幅逐渐变缓，在14期后增幅尤为缓慢。

综上，电能传输过程初期，线路技术性损耗发挥主导作用；下属专变用户中，线损电量的方差贡献主要来自*U*8，*U*9，*U*4。其中*U*8对线损的冲击是显著的，U9对方差影响不突出，U4的冲击较明显，但其负荷占到整条线路负荷的20%，表现出明显的冲击效应具有合理性，可排除嫌疑。因此，结合脉冲响应分析，可将*U*8用户确定为该线路下窃电嫌疑最大的用户。经现场稽查，确证用户*U*8存在窃电行为。

**表B1 线路2# 滞后阶数选择AIC、SC准则和序列相关LM统计量**

**Table B1 Lag order selection AIC,SC guidelines, and sequence-related LM statistics of line 2#**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 阶数*p* | 不含时间趋势项 | | | | 包含时间趋势项 | | | |
| AIC | SC |  |  | AIC | SC |  |  |
| 1 | 15.9966 | 16.3636 | 0.2504 | 1.2350 | 15.6996 | 16.0666 | 0.0225 | 1.8120 |
| 2 | 15.9966 | 16.3636 | 0.2504 | 1.2350 | 15.6996 | 16.0666 | 0.0225 | 1.8120 |
| 3 | 15.9966 | 16.3636 | 0.2504 | 1.2350 | 15.6406 | 16.0653 | 0.9246 | 2.5758\*\* |
| 4 | 15.8268 | 16.2809 | 0.0646 | 2.2708\*\*\* | 15.2385 | 15.9330 | 8.5036 | 2.9254 |
| 5 | 15.8268 | 16.2809 | 0.0646\*\*\* | 2.2708\*\*\* | 15.0825 | 15.9158 | 0.9306 | 0.6871\*\* |

**表B2 线路2# 长期协整方程估计结果**

**Table B2 Long-term co-organization equation estimates of line 2#**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 变量 | 系数 | 标准误差 | t统计量 | P值 | |
|  | 0.1701 | 0.4793 | 0.3548 | 0.7238 | |
|  | -2.5781 | 0.3526 | -7.3114 | 0.0000 | |
|  | 0.6952 | 0.4816 | 1.4434 | 0.1534 | |
|  | 0.6587 | 0.2436 | 2.7040 | 0.0086 | |
|  | -0.5145 | 0.1211 | -4.2493 | 0.0001 | |
|  | 1.0865 | 0.5584 | 1.9459 | 0.0557 | |
|  | 2.5715 | 1.3244 | 1.9416 | 0.0562 | |
|  | 7.2908 | 2.1537 | 3.3852 | 0.0012 | |
|  | -10.4256 | 2.3483 | -4.4397 | 0.0000 | |
|  |  |  |  |  |

**表B3 线路2# 无约束ECM估计结果**

**Table B3 Error correction model estimate results of line 2#**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 变量 | 系数 | 标准误差 | t统计量 | P值 |
| C | -1959.0210 | 629.1780 | -3.1136 | 0.0027 |
| T | 43.1916 | 5.1077 | 8.4562 | 0.0000 |
|  | -1.1111 | 0.1191 | -9.3320 | 0.0000 |
|  | 0.1890 | 0.5288 | 0.3574 | 0.7219 |
|  | -2.8646 | 0.4091 | -7.0017 | 0.0000 |
|  | 0.7724 | 0.6150 | 1.2560 | 0.2133 |
|  | 0.7319 | 0.2665 | 2.7461 | 0.0077 |
|  | -0.5717 | 0.1345 | -4.2515 | 0.0001 |
|  | 1.2072 | 0.6136 | 1.9674 | 0.0531 |
|  | 2.8573 | 1.1666 | 2.4492 | 0.0168 |
|  | 8.1011 | 2.2954 | 3.5292 | 0.0007 |
|  | -11.5843 | 2.5611 | -4.5232 | 0.0000 |
|  | -0.1956 | 0.0950 | -2.0595 | 0.0432 |
|  | -0.1227 | 0.0935 | -1.3123 | 0.1937 |
|  | 0.2117 | 0.0790 | 2.6787 | 0.0092 |
|  | -1.6882 | 0.3319 | -5.0870 | 0.0000 |
|  | -0.2123 | 0.2221 | -0.9558 | 0.3425 |
|  | -0.8982 | 0.1334 | -6.7352 | 0.0000 |
|  | 0.6520 | 1.6992 | 0.3837 | 0.7024 |
|  | -9.5994 | 2.0257 | -4.7389 | 0.0000 |
|  | -10.4553 | 1.8408 | -5.6797 | 0.0000 |
|  | -6.1113 | 1.6498 | -3.7043 | 0.0004 |
|  | -0.6073 | 1.5579 | -0.3898 | 0.6978 |
|  | 8.8042 | 2.0950 | 4.2025 | 0.0001 |
|  | 6.6091 | 1.8636 | 3.5465 | 0.0007 |
|  | 3.8616 | 1.3937 | 2.7708 | 0.0072 |
|  | -1.1111 | 0.0923 | -12.0372 | 0.0000 |
|  |  |  |  |  |

**表B4线路2#VAR模型滞后期确定值检验**

**Table B4 VAR model lag determination value test of line 2#**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 滞后期 | LR | FPE | AIC | SC | HQ |
| 1 | 626.6110 | 9.57e+41 | 125.0320 | 128.0470 | 126.2490 |
| 2 | 173.2050 | 7.87e+41 | 124.7660 | 130.5220 | 127.0890 |
| 3 | 183.4140 | 4.15e+41 | 123.9330 | 132.4310 | 127.3630 |
| 4 | 126.2990\* | 4.56e+41\* | 123.6310\* | 134.8690\* | 128.1670\* |
| 5 | 154.8640 | 1.91e+41 | 122.0270 | 136.0070 | 127.6690 |

**表B5 线路2#VAR模型估计结果**

**Table B5 Var model estimates of line 2#**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |
|  | 0.4148 | 0.1351 | 0.2850 | -0.2252 | -0.2123 | 0.4018 | 0.1119 | 0.1463 | 0.1508 | 0.3699 |
| (0.1334) | (0.2063) | (0.1605) | (0.3416) | (0.5521) | (0.2044) | (0.0942) | (0.1029) | (0.1090) | (1.0659) |
| [ 3.1080] | [ 0.6548] | [ 1.7761] | [-0.6593] | [-0.3846] | [ 1.9658] | [ 1.1873] | [ 1.4211] | [ 1.3834] | [ 0.3471] |
|  | 0.0526 | 0.0205 | 0.1156 | 0.9672 | 0.2092 | 0.1617 | 0.0993 | 0.0748 | -0.0418 | 0.9547 |
| (0.1317) | (0.2037) | (0.1584) | (0.3373) | (0.5451) | (0.2018) | (0.0930) | (0.1016) | (0.1076) | (1.0524) |
| [ 0.3992] | [ 0.1007] | [ 0.7298] | [ 2.8674] | [ 0.3838] | [ 0.8013] | [ 1.0675] | [ 0.7368] | [-0.3891] | [ 0.9071] |
|  | 0.1196 | -0.2164 | -0.0275 | -0.5611 | -0.2637 | -0.1137 | -0.0724 | -0.1293 | -0.0563 | 1.4715 |
| (0.1456) | (0.2251) | (0.1751) | (0.3728) | (0.6025) | (0.2230) | (0.1028) | (0.1123) | (0.1189) | (1.1630) |
| [ 0.8213] | [-0.9615] | [-0.1574] | [-1.5051] | [-0.4376] | [-0.5098] | [-0.7047] | [-1.1512] | [-0.4734] | [ 1.2652] |
|  | -0.1843 | -0.0290 | -0.1043 | 0.1441 | -0.6723 | -0.1171 | 0.0338 | -0.0958 | -0.0758 | 1.2332 |
| (0.1433) | (0.2216) | (0.1724) | (0.3669) | (0.5931) | (0.2195) | (0.1012) | (0.1105) | (0.1170) | (1.1449) |
| [-1.2856] | [-0.1310] | [-0.6052] | [ 0.3928] | [-1.1336] | [-0.5333] | [ 0.3347] | [-0.8664] | [-0.6474] | [ 1.0771] |
|  | 0.0355 | 0.6449 | 0.3310 | 0.3186 | 0.5806 | 0.2201 | 0.1619 | 0.0798 | 0.1016 | -1.2578 |
| (0.0870) | (0.1346) | (0.1047) | (0.2228) | (0.3601) | (0.1333) | (0.0615) | (0.0671) | (0.0711) | (0.6950) |
| [ 0.4075] | [ 4.7932] | [ 3.1627] | [ 1.4298] | [ 1.6125] | [ 1.6510] | [ 2.6333] | [ 1.1881] | [ 1.4294] | [-1.8096] |
|  | -0.0843 | 0.0922 | -0.1310 | -0.0973 | -0.0331 | -0.1391 | -0.0210 | -0.0315 | -0.0085 | -0.0750 |
| (0.0941) | (0.1454) | (0.1131) | (0.2408) | (0.3891) | (0.1441) | (0.0664) | (0.0726) | (0.0768) | (0.7512) |
| [-0.8962] | [ 0.6343] | [-1.1581] | [-0.4042] | [-0.0851] | [-0.9656] | [-0.3161] | [-0.4340] | [-0.1103] | [-0.0998] |
|  | 0.0921 | -0.0013 | 0.2270 | 0.1926 | -0.0126 | 0.1984 | 0.1107 | 0.1039 | 0.0816 | 1.3297 |
| (0.0977) | (0.1510) | (0.1175) | (0.2501) | (0.4042) | (0.1496) | (0.0690) | (0.0754) | (0.0798) | (0.7802) |
| [ 0.9428] | [-0.0086] | [ 1.9318] | [ 0.7700] | [-0.0312] | [ 1.3261] | [ 1.6039] | [ 1.3783] | [ 1.0232] | [ 1.7042] |
|  | -0.0772 | 0.2854 | -0.1205 | 0.0658 | 0.2227 | -0.1196 | -0.0417 | -0.0324 | -0.0007 | 0.1228 |
| (0.0845) | (0.1306) | (0.1016) | (0.2163) | (0.3496) | (0.1294) | (0.0597) | (0.0652) | (0.0690) | (0.6748) |
| [-0.9132] | [ 2.1851] | [-1.1863] | [ 0.3040] | [ 0.6370] | [-0.9245] | [-0.6984] | [-0.4979] | [-0.0101] | [ 0.1820] |
|  | 0.2642 | 0.3439 | 0.6499 | -0.0777 | -0.2644 | -0.1944 | -0.0227 | 0.0222 | 0.0522 | -1.2601 |
| (0.1773) | (0.2741) | (0.2132) | (0.4539) | (0.7336) | (0.2716) | (0.1252) | (0.1368) | (0.1448) | (1.4161) |
| [ 1.4899] | [ 1.2544] | [ 3.0478] | [-0.1711] | [-0.3604] | [-0.7159] | [-0.1813] | [ 0.1623] | [ 0.3607] | [-0.8898] |
|  | -0.1601 | 0.0819 | 0.0529 | -0.3086 | -1.5922 | 0.1148 | -0.0565 | 0.0289 | 0.0112 | 1.4367 |
| (0.1951) | (0.3016) | (0.2346) | (0.4993) | (0.8070) | (0.2987) | (0.1378) | (0.1505) | (0.1593) | (1.5578) |
| [-0.8209] | [ 0.2714] | [ 0.2256] | [-0.6181] | [-1.9730] | [ 0.3844] | [-0.4099] | [ 0.1922] | [ 0.0701] | [ 0.9222] |
|  | -0.1511 | -0.6206 | -0.3757 | 0.2776 | 0.4064 | -0.2977 | -0.1720 | -0.3357 | -0.3974 | 0.6652 |
| (0.1992) | (0.3080) | (0.2396) | (0.5100) | (0.8242) | (0.3051) | (0.1407) | (0.1537) | (0.1627) | (1.5910) |
| [-0.7583] | [-2.0151] | [-1.5682] | [ 0.5443] | [ 0.4931] | [-0.9756] | [-1.2224] | [-2.1847] | [-2.4424] | [ 0.4180] |
|  | 0.0059 | -0.2272 | -0.0094 | -0.2748 | 1.2469 | 0.1456 | 0.0348 | 0.0821 | 0.1619 | -2.6066 |
| (0.1951) | (0.3016) | (0.2346) | (0.4994) | (0.8072) | (0.2988) | (0.1378) | (0.1505) | (0.1594) | (1.5582) |
| [ 0.0304] | [-0.7533] | [-0.0400] | [-0.5502] | [ 1.5448] | [ 0.4873] | [ 0.2523] | [ 0.5458] | [ 1.0162] | [-1.6728] |
|  | 0.0124 | 0.2719 | 0.0249 | 0.1413 | -0.3240 | 0.0315 | -0.0092 | -0.0009 | 0.0179 | 1.0205 |
| (0.0575) | (0.0888) | (0.0691) | (0.1471) | (0.2377) | (0.0880) | (0.0406) | (0.0443) | (0.0469) | (0.4588) |
| [ 0.2150] | [ 3.0617] | [ 0.3602] | [ 0.9609] | [-1.3631] | [ 0.3578] | [-0.2269] | [-0.0204] | [ 0.3813] | [ 2.2242] |
|  | 0.0091 | -0.0525 | -0.1091 | -0.1387 | -0.3118 | -0.0742 | -0.0866 | -0.0055 | -0.0248 | 0.6582 |
| (0.0556) | (0.0860) | (0.0669) | (0.1424) | (0.2302) | (0.0852) | (0.0393) | (0.0429) | (0.0454) | (0.4444) |
| [ 0.1629] | [-0.6098] | [-1.6298] | [-0.9736] | [-1.3546] | [-0.8705] | [-2.2028] | [-0.1270] | [-0.5453] | [ 1.4812] |
|  | 0.0472 | -0.0615 | 0.0376 | 0.3289 | -0.0497 | 0.0316 | 0.0024 | -0.0004 | -0.0181 | 0.3043 |
| (0.0569) | (0.0880) | (0.0684) | (0.1457) | (0.2354) | (0.0872) | (0.0402) | (0.0439) | (0.0465) | (0.4545) |
| [ 0.8288] | [-0.6989] | [ 0.5491] | [ 2.2579] | [-0.2109] | [ 0.3628] | [ 0.0586] | [-0.0099] | [-0.3897] | [ 0.6694] |
|  | -0.0467 | -0.2265 | -0.0023 | -0.0303 | 0.2539 | -0.0769 | -0.0179 | 0.0131 | 0.0480 | -0.0409 |
| (0.0615) | (0.0950) | (0.0739) | (0.1574) | (0.2543) | (0.0941) | (0.0434) | (0.0474) | (0.0502) | (0.4909) |
| [-0.7597] | [-2.3835] | [-0.0308] | [-0.1925] | [ 0.9985] | [-0.8170] | [-0.4113] | [ 0.2767] | [ 0.9553] | [-0.0833] |
|  | 0.0225 | 0.0180 | 0.0526 | -0.1667 | 0.6002 | -0.0583 | 0.0053 | -0.0091 | 0.0109 | 0.2831 |
| (0.0392) | (0.0606) | (0.0471) | (0.1003) | (0.1621) | (0.0600) | (0.0277) | (0.0302) | (0.0320) | (0.3130) |
| [ 0.5731] | [ 0.2973] | [ 1.1154] | [-1.6618] | [ 3.7019] | [-0.9705] | [ 0.1924] | [-0.3009] | [ 0.3420] | [ 0.9045] |
|  | -0.0521 | 0.0853 | -0.0478 | 0.2331 | -0.2445 | 0.0611 | -0.0158 | -0.0150 | -0.0191 | -0.1288 |
| (0.0496) | (0.0767) | (0.0597) | (0.1270) | (0.2052) | (0.0760) | (0.0350) | (0.0383) | (0.0405) | (0.3962) |
| [-1.0499] | [ 1.1118] | [-0.8016] | [ 1.8355] | [-1.1913] | [ 0.8043] | [-0.4520] | [-0.3921] | [-0.4725] | [-0.3251] |
|  | 0.0990 | 0.0008 | 0.0014 | -0.0372 | 0.0646 | -0.0289 | 0.0259 | -0.0177 | -0.0237 | 0.5901 |
| (0.0490) | (0.0758) | (0.0589) | (0.1255) | (0.2028) | (0.0751) | (0.0346) | (0.0378) | (0.0400) | (0.3914) |
| [ 2.0201] | [ 0.0102] | [ 0.0242] | [-0.2965] | [ 0.3187] | [-0.3856] | [ 0.7494] | [-0.4695] | [-0.5914] | [ 1.5077] |
|  | -0.0757 | -0.0443 | -0.0470 | 0.0625 | 0.3684 | 0.0061 | -0.0157 | -0.0181 | 0.0045 | -0.5550 |
| (0.0428) | (0.0662) | (0.0515) | (0.1096) | (0.1771) | (0.0656) | (0.0302) | (0.0330) | (0.0350) | (0.3419) |
| [-1.7688] | [-0.6694] | [-0.9123] | [ 0.5702] | [ 2.0800] | [ 0.0937] | [-0.5194] | [-0.5480] | [ 0.1279] | [-1.6232] |
|  | 0.1203 | 0.1146 | -0.0285 | 0.3333 | 0.1674 | 0.1838 | -0.0092 | -0.0457 | -0.0232 | -2.0270 |
| (0.1622) | (0.2508) | (0.1951) | (0.4153) | (0.6711) | (0.2485) | (0.1146) | (0.1251) | (0.1325) | (1.2956) |
| [ 0.7414] | [ 0.4569] | [-0.1458] | [ 0.8027] | [ 0.2493] | [ 0.7396] | [-0.0804] | [-0.3652] | [-0.1748] | [-1.5645] |
|  | -0.0492 | 0.4215 | -0.0897 | -0.6758 | 1.1705 | -0.2821 | -0.1953 | -0.1381 | -0.1637 | -1.6721 |
| (0.1460) | (0.2257) | (0.1755) | (0.3737) | (0.6039) | (0.2236) | (0.1031) | (0.1126) | (0.1192) | (1.1658) |
| [-0.3372] | [ 1.8679] | [-0.5111] | [-1.8084] | [ 1.9381] | [-1.2619] | [-1.8946] | [-1.2263] | [-1.3732] | [-1.4343] |
|  | -0.0632 | 0.2067 | -0.0630 | -0.4748 | -0.4473 | 0.2712 | -0.0476 | -0.0116 | 0.0325 | -1.8623 |
| (0.1616) | (0.2499) | (0.1944) | (0.4137) | (0.6687) | (0.2475) | (0.1142) | (0.1247) | (0.1320) | (1.2908) |
| [-0.3909] | [ 0.8273] | [-0.3243] | [-1.1476] | [-0.6689] | [ 1.0955] | [-0.4167] | [-0.0933] | [ 0.2463] | [-1.4427] |
|  | 0.3101 | -0.3429 | -0.1891 | -0.4464 | 0.1242 | 0.2276 | -0.0092 | 0.0467 | 0.0453 | 1.7216 |
| (0.1685) | (0.2604) | (0.2026) | (0.4312) | (0.6969) | (0.2580) | (0.1190) | (0.1299) | (0.1376) | (1.3454) |
| [ 1.8408] | [-1.3164] | [-0.9333] | [-1.0350] | [ 0.1781] | [ 0.8820] | [-0.0775] | [ 0.3591] | [ 0.3294] | [ 1.2796] |
|  | -0.0825 | -0.6430 | -0.9594 | 0.9594 | -0.1431 | -0.1724 | 0.1591 | -0.2864 | -0.3876 | 3.5590 |
|  | (0.3878) | (0.5995) | (0.4664) | (0.9927) | (1.6044) | (0.5939) | (0.2739) | (0.2991) | (0.3167) | (3.0971) |
|  | [-0.2127] | [-1.0724] | [-2.0571] | [ 0.9664] | [-0.0891] | [-0.2903] | [ 0.5806] | [-0.9575] | [-1.2237] | [ 1.1491] |
|  | 0.5252 | -1.6587 | 0.4556 | 0.6121 | 1.5501 | 0.2912 | 0.2953 | 0.0290 | 0.2251 | -3.8623 |
| (0.4278) | (0.6613) | (0.5144) | (1.0950) | (1.7697) | (0.6551) | (0.3021) | (0.3299) | (0.3494) | (3.4161) |
| [ 1.2278] | [-2.5082] | [ 0.8857] | [ 0.5589] | [ 0.8759] | [ 0.4445] | [ 0.9773] | [ 0.0878] | [ 0.6443] | [-1.1306] |
|  | -0.4117 | -0.2690 | 0.1431 | -1.1070 | 1.5657 | -0.2486 | 0.1297 | 0.4809 | 0.4874 | -2.7591 |
| (0.4309) | (0.6661) | (0.5182) | (1.1030) | (1.7825) | (0.6599) | (0.3043) | (0.3323) | (0.3519) | (3.4410) |
| [-0.9554] | [-0.4038] | [ 0.2761] | [-1.0036] | [ 0.8783] | [-0.3766] | [ 0.4260] | [ 1.4470] | [ 1.3848] | [-0.8018] |
|  | 0.7057 | 1.4140 | 0.5647 | 1.5044 | -1.3237 | 0.3221 | 0.3243 | 0.0199 | -0.0662 | -1.5364 |
| (0.3744) | (0.5787) | (0.4502) | (0.9583) | (1.5487) | (0.5733) | (0.2644) | (0.2887) | (0.3058) | (2.9896) |
| [ 1.8851] | [ 2.4433] | [ 1.2544] | [ 1.5698] | [-0.8547] | [ 0.5617] | [ 1.2265] | [ 0.0688] | [-0.2164] | [-0.5139] |
|  | -0.3917 | 0.0921 | 0.5533 | 1.1614 | -0.2308 | 1.4477 | 0.6222 | 0.8369 | 0.4097 | 0.8381 |
| (0.4044) | (0.6253) | (0.4864) | (1.0353) | (1.6732) | (0.6194) | (0.2857) | (0.3120) | (0.3303) | (3.2299) |
| [-0.9685] | [ 0.1472] | [ 1.1377] | [ 1.1218] | [-0.1379] | [ 2.3372] | [ 2.1779] | [ 2.6828] | [ 1.2402] | [ 0.2594] |
|  | 0.5425 | -0.0080 | -0.3600 | -0.3065 | 1.2207 | -0.2584 | -0.1449 | -0.4884 | -0.4645 | -2.5293 |
| (0.4102) | (0.6341) | (0.4932) | (1.0499) | (1.6968) | (0.6282) | (0.2897) | (0.3164) | (0.3350) | (3.2755) |
| [ 1.3226] | [-0.0126] | [-0.7298] | [-0.2919] | [ 0.7194] | [-0.4113] | [-0.5002] | [-1.5439] | [-1.3866] | [-0.7721] |
|  | -0.3884 | 0.0632 | 0.2871 | -0.2064 | -1.3599 | 0.3300 | 0.5332 | 0.4800 | 0.4621 | 7.7892 |
| (0.4137) | (0.6396) | (0.4975) | (1.0591) | (1.7116) | (0.6336) | (0.2922) | (0.3191) | (0.3379) | (3.3040) |
| [-0.9386] | [ 0.0988] | [ 0.5769] | [-0.1948] | [-0.7945] | [ 0.5207] | [ 1.8245] | [ 1.5041] | [ 1.3676] | [ 2.3574] |
|  | -0.1209 | 0.8122 | -0.2708 | -0.8371 | -0.5548 | -0.9539 | -0.3702 | -0.4410 | -0.3702 | 3.5216 |
| (0.4280) | (0.6617) | (0.5147) | (1.0957) | (1.7707) | (0.6555) | (0.3023) | (0.3301) | (0.3496) | (3.4182) |
| [-0.2825] | [ 1.2274] | [-0.5261] | [-0.7640] | [-0.3133] | [-1.4551] | [-1.2244] | [-1.3358] | [-1.0589] | [ 1.0302] |
|  | -0.2497 | -0.6230 | 0.2635 | -1.2080 | 1.5510 | 0.4063 | 0.0830 | 0.3335 | 0.6002 | -2.3550 |
| (0.3516) | (0.5436) | (0.4228) | (0.9000) | (1.4546) | (0.5385) | (0.2484) | (0.2712) | (0.2872) | (2.8079) |
| [-0.7100] | [-1.1461] | [ 0.6231] | [-1.3421] | [ 1.0662] | [ 0.7545] | [ 0.3342] | [ 1.2297] | [ 2.0899] | [-0.8387] |
|  | -0.1364 | 0.1904 | 0.2666 | 1.7123 | -2.0616 | -0.0485 | 0.1707 | 0.3011 | 0.3794 | 1.9730 |
| (0.3510) | (0.5426) | (0.4221) | (0.8984) | (1.4520) | (0.5375) | (0.2479) | (0.2707) | (0.2867) | (2.8029) |
| [-0.3885] | [ 0.3509] | [ 0.6317] | [ 1.9058] | [-1.4198] | [-0.0902] | [ 0.6885] | [ 1.1120] | [ 1.3236] | [ 0.7039] |
|  | 0.3925 | 0.7045 | 0.2961 | 0.7850 | 0.0556 | 0.3879 | -0.0132 | 0.0249 | -0.1098 | -0.2119 |
| (0.3517) | (0.5438) | (0.4230) | (0.9003) | (1.4551) | (0.5387) | (0.2484) | (0.2713) | (0.2873) | (2.8089) |
| [ 1.1157] | [ 1.2956] | [ 0.6999] | [ 0.8718] | [ 0.0381] | [ 0.7200] | [-0.0529] | [ 0.0918] | [-0.3821] | [-0.0754] |
|  | -0.9724 | -0.4273 | -0.0777 | 0.2154 | -1.9374 | -0.1677 | -0.1194 | -0.0427 | -0.1746 | 1.1938 |
| (0.3171) | (0.4902) | (0.3813) | (0.8116) | (1.3117) | (0.4856) | (0.2240) | (0.2446) | (0.2590) | (2.5321) |
| [-3.0667] | [-0.8717] | [-0.2037] | [ 0.2653] | [-1.4770] | [-0.3453] | [-0.5331] | [-0.1748] | [-0.6742] | [ 0.4714] |
|  | 0.0757 | 0.0454 | 0.1395 | 0.1791 | -0.1079 | 0.1093 | 0.0795 | 0.0500 | 0.0702 | 0.3372 |
| (0.0211) | (0.0326) | (0.0253) | (0.0539) | (0.0871) | (0.0322) | (0.0149) | (0.0162) | (0.0172) | (0.1681) |
| [ 3.5955] | [ 1.3944] | [ 5.5108] | [ 3.3241] | [-1.2391] | [ 3.3889] | [ 5.3446] | [ 3.0808] | [ 4.0816] | [ 2.0057] |
|  | -0.0696 | 0.0369 | -0.0492 | -0.0294 | -0.0584 | -0.0540 | -0.0264 | -0.0277 | -0.0228 | 0.3433 |
| (0.0250) | (0.0387) | (0.0301) | (0.0641) | (0.1035) | (0.0383) | (0.0177) | (0.0193) | (0.0204) | (0.1999) |
| [-2.7823] | [ 0.9549] | [-1.6356] | [-0.4590] | [-0.5645] | [-1.4080] | [-1.4915] | [-1.4340] | [-1.1163] | [ 1.7178] |
|  | 0.0082 | 0.0939 | -0.0261 | 0.0645 | 0.0331 | 0.0018 | 0.0108 | -0.0126 | -0.0341 | 0.4151 |
| (0.0265) | (0.0409) | (0.0318) | (0.0678) | (0.1095) | (0.0405) | (0.0187) | (0.0204) | (0.0216) | (0.2114) |
| [ 0.3092] | [ 2.2957] | [-0.8197] | [ 0.9526] | [ 0.3021] | [ 0.0454] | [ 0.5750] | [-0.6153] | [-1.5792] | [ 1.9638] |
|  | -0.0141 | -0.0147 | -0.0207 | -0.0107 | 0.2488 | -0.0147 | -0.0103 | -0.0082 | 0.0063 | -0.4870 |
| (0.0251) | (0.0388) | (0.0301) | (0.0642) | (0.1037) | (0.0384) | (0.0177) | (0.0193) | (0.0205) | (0.2002) |
| [-0.5615] | [-0.3795] | [-0.6859] | [-0.1674] | [ 2.3996] | [-0.3839] | [-0.5807] | [-0.4226] | [ 0.3062] | [-2.4330] |
| C | -435.2035 | 313.8641 | 797.5617 | 941.2593 | -744.7282 | 668.2310 | 479.9997 | 282.5191 | 202.2926 | 4830.8510 |
| (229.0060) | (354.0350) | (275.3940) | (586.2050) | (947.3920) | (350.7170) | (161.7510) | (176.6350) | (187.0360) | (1828.8500) |
| [-1.9004] | [ 0.8865] | [ 2.8960] | [ 1.6056] | [-0.7860] | [ 1.9053] | [ 2.9675] | [ 1.5994] | [ 1.0815] | [ 2.6414] |

**表B6 线路2#线损电量与用电量的方差分解表**

**Table B6 Variance decomposition of the line loss and electricity usage of usees of line 2#**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 时期 | 标准差 | 自身解释  比例(%) | 九大因素  解释(%) | 其中(%) | | | | | | | | |
|  |  |  |  |  |  |  |  |  |
| 1 | 72.7590 | 42.9890 | 57.0110 | 4.6410 | 1.4070 | 10.5260 | 25.0810 | 2.6050 | 1.1490 | 2.5830 | 5.4320 | 3.5870 |
| 2 | 89.6690 | 33.7240 | 66.2760 | 3.4470 | 4.3940 | 8.2850 | 29.3100 | 1.9340 | 0.8650 | 5.0130 | 8.2810 | 4.7450 |
| 3 | 98.7640 | 26.6170 | 73.3830 | 2.1100 | 6.6360 | 6.3330 | 27.1870 | 1.2380 | 1.1420 | 3.6410 | 18.0290 | 7.0670 |
| 4 | 110.3020 | 22.7010 | 77.2990 | 2.0610 | 10.6020 | 4.7920 | 23.8460 | 5.2100 | 0.9740 | 2.8350 | 21.3740 | 5.6040 |
| 5 | 113.9080 | 19.2560 | 80.7440 | 1.8840 | 15.3570 | 5.6210 | 20.7600 | 6.6270 | 0.8300 | 3.9540 | 20.5090 | 5.2000 |
| 6 | 124.0170 | 17.6020 | 82.3980 | 5.5020 | 13.9810 | 5.3410 | 18.8970 | 8.9200 | 1.1960 | 4.2140 | 19.6120 | 4.7350 |
| 7 | 134.0360 | 16.8930 | 83.1070 | 7.9620 | 13.5960 | 5.0700 | 17.8670 | 9.0180 | 1.2280 | 3.9350 | 19.7320 | 4.6980 |
| 8 | 141.7280 | 16.4240 | 83.5760 | 8.4300 | 13.0290 | 4.8670 | 17.7750 | 8.7520 | 1.2150 | 5.5400 | 19.4490 | 4.5200 |
| 9 | 149.3260 | 15.4350 | 84.5650 | 7.7120 | 12.2130 | 4.9300 | 17.2520 | 8.1090 | 1.4550 | 5.7920 | 20.9440 | 6.1580 |
| 10 | 153.5960 | 14.0880 | 85.9120 | 7.4290 | 12.0690 | 5.6860 | 15.7910 | 7.4210 | 1.5140 | 5.2830 | 21.7700 | 8.9480 |
| 11 | 157.1520 | 13.3270 | 86.6730 | 7.0850 | 12.3660 | 5.4620 | 14.6910 | 6.9780 | 4.1350 | 4.9060 | 21.3220 | 9.7290 |
| 12 | 161.4210 | 13.0770 | 86.9230 | 6.8070 | 12.4310 | 5.1590 | 14.0060 | 6.6250 | 4.1670 | 4.7960 | 21.4110 | 11.5210 |
| 13 | 166.0020 | 12.4980 | 87.5020 | 6.6360 | 12.2030 | 5.0900 | 13.6620 | 6.3800 | 4.4650 | 4.6670 | 22.5290 | 11.8700 |
| 14 | 171.6680 | 12.5030 | 87.4970 | 6.4000 | 12.0920 | 4.9030 | 13.3340 | 6.7290 | 4.3190 | 4.8050 | 23.4040 | 11.5110 |
| 15 | 176.5870 | 12.6490 | 87.3510 | 6.3660 | 11.8880 | 4.8240 | 13.1290 | 6.6300 | 4.3090 | 5.1180 | 23.3820 | 11.7050 |
| 16 | 179.2130 | 12.6250 | 87.3750 | 6.4000 | 11.6640 | 5.0210 | 12.8470 | 6.6050 | 4.2480 | 5.0110 | 23.5860 | 11.9930 |
| 17 | 181.0140 | 12.4390 | 87.5610 | 6.2520 | 11.4010 | 4.9430 | 12.5370 | 6.6060 | 4.1630 | 4.8800 | 23.7760 | 13.0020 |
| 18 | 182.3650 | 12.2360 | 87.7640 | 6.2720 | 11.1960 | 4.9100 | 12.2770 | 6.5100 | 4.1180 | 4.7720 | 23.5770 | 14.1310 |

附录**C**

配电线路1# 线损电量*S*与下属6个专变用户的长期协整方程为：

 (C1)

配电线路1# 线损电量*S*与下属6个专变用户的无约束ECM为：

 (C2)

其中



配电线路2# 线损电量*V*与下属9个专变用户的长期协整方程为：

 (C3)

配电线路2# 线损电量*V*与下属9个专变用户的无约束ECM为：

 (C4)

其中